EU Fusion for ITER Applications

KIT Karlsruhe Institute of Technology

EUFORIA

Bringing a comprehensive framework and e-infrastructure to the fusion modelling community oriented to the development

Objectives

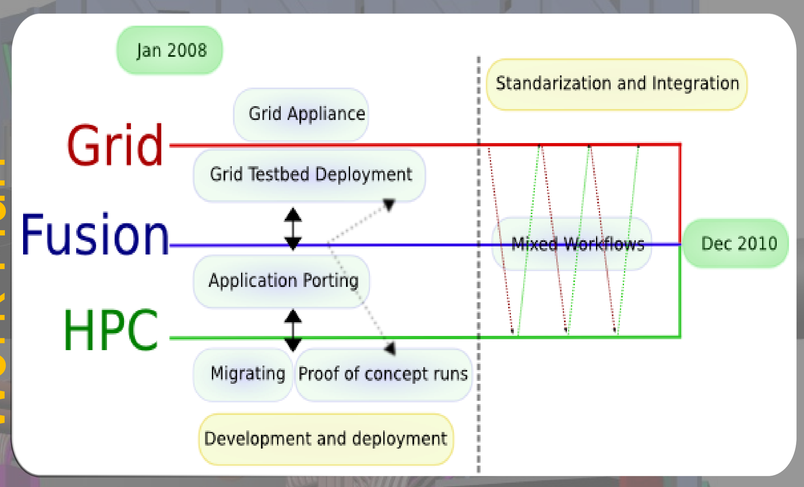
Unified access to Grid and HPC platforms
- Architecture design in contact with omii-europe

Adaptation and Optimization of Fusion Codes
- Porting to Grid and/or HPC

Integration of Grid and HPC
- Workflow management
- Mixed Workflows
- Inter Process Communication across platforms

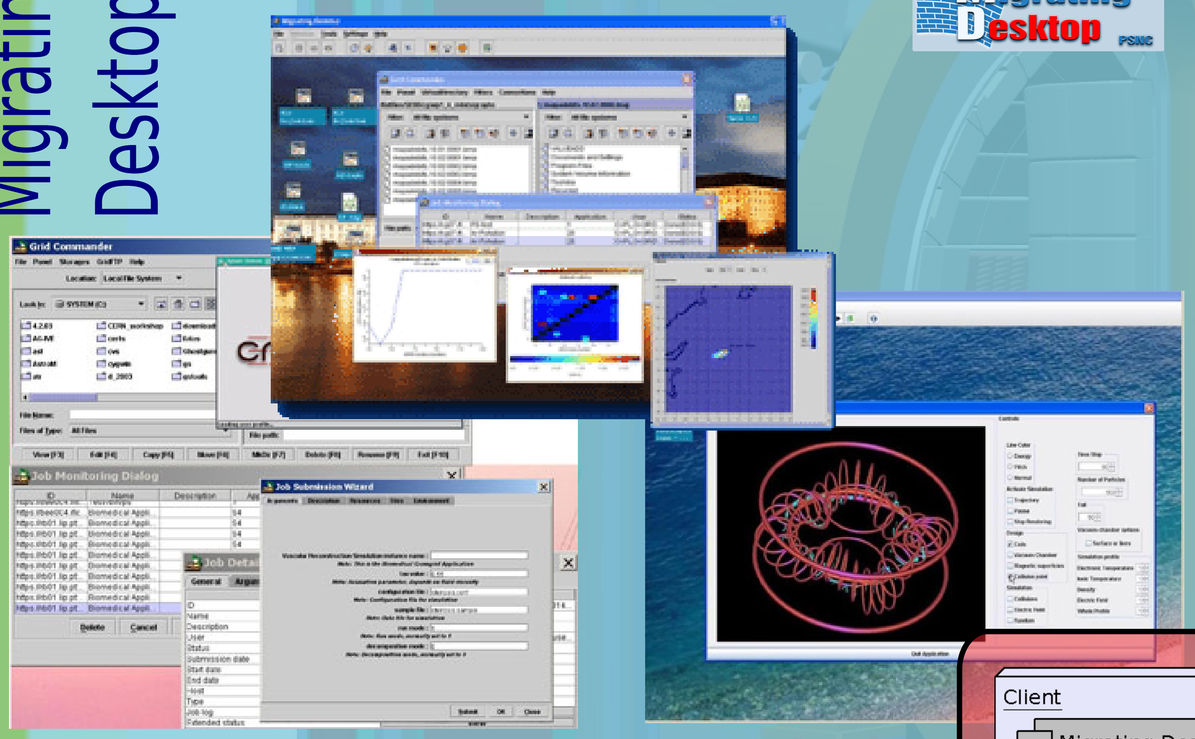
omii europe open middleware infrastructure institute

Work Plan

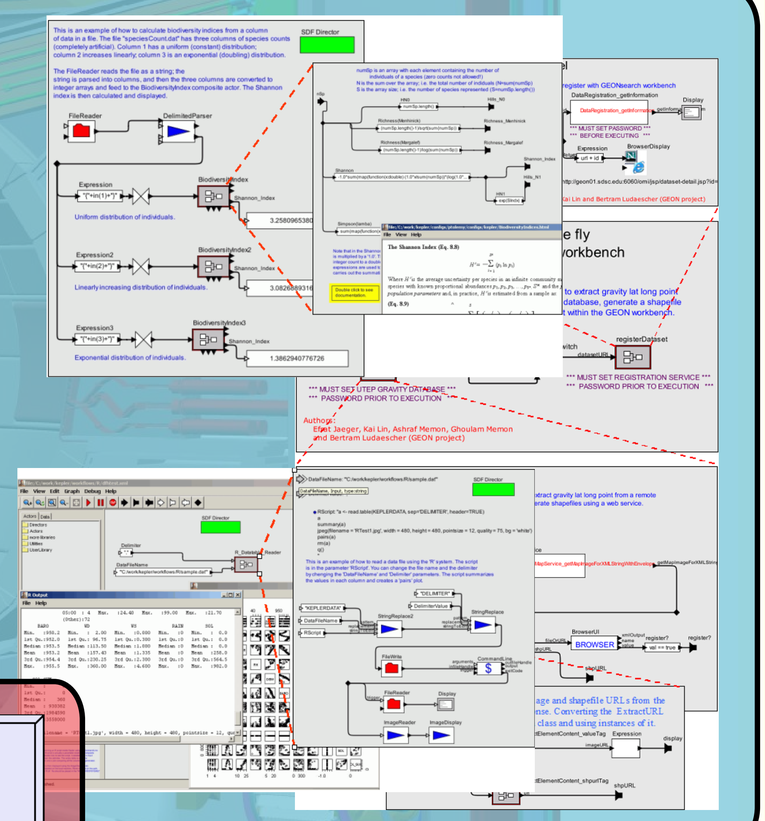


Migrating Desktop

Migrating Desktop PSNC



Kepler Workflow

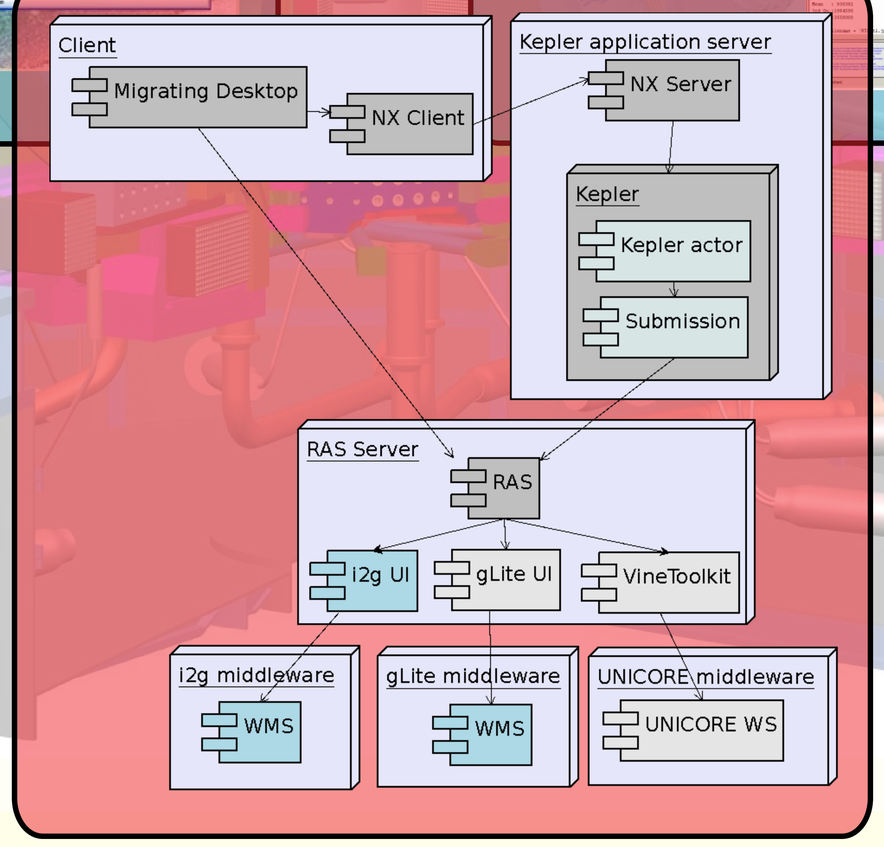


Integration

Migrating Desktop:
- **Key** Integration Platform

Kepler:
- Runs **within** Migrating Desktop
- Workflow engine

Roaming Access Server (**RAS**):
- Provides **Webservices** Interface
- Integrates **many grid backends**



BIT1 (s+p) [Kinetic 1D3V (1D in usual and 3D in velocity space) code for simulation of the plasma edge. Code includes nonlinear model for Coulomb and charged-neutral particle collisions, and simplified linear model of plasma-surface interactions.]

CENTORI (p) [The CENTORI code is a fully toroidal (arbitrary aspect ratio, arbitrary beta) two-fluid, electromagnetic turbulence simulation code. It builds on the well-documented CUTIE code by allowing the computation of turbulence in realistic tokamak geometries and at high beta.]

COREDIV (s+p) [Transport of energy, main ions and impurity ions in the core and the scrape of layer regions]

EIRENE (s+p) [EIRENE is a kinetic neutral particle and line radiation transport code.]

ERO (s+p) [gyro-kinetic for impurity transport in plasma + following of molecular and atomic processes (providing 3D simulation of densities and plasma light emission) + plasma-surface interaction part including simulation of surface contents]

ELMFIRE (p) [Gyro-kinetic full-f particle code, with mostly global emphasis.]

ISDEP (p) [Kinetic theory of transport based on Langevin Equations; Ion-ion and ion-electron collisions included; New stochastic terms (heating and turbulence) are envisaged]

SOLPS (s+p) [B2-Eirene consists of two codes tightly coupled together: B2 (multi-fluid solving continuity, momentum and energy equations for the plasma component on a cell cetntered grid; EIRENE (Monte-Carlo neutrals code providing sources for B2 based on a plasma background provided by B2)]

TECXY (p) [The code simulates 2D multifluid plasma and impurity transport in the tokamak edge including drifts, currents and self-consistent electric field Solves a set of fluid equations (Braginskij equations) describing the edge plasma on a 2D grid including SOL and transition layer

GEM (p) [gyrofluid (GEM is local, GEMX is nonlocal, 6 moment variable equations for each species, plus field equations for 2 potentials (electric, parallel magnetic); up to three ion species have been run; turbulence and profiles solved together, flow and magnetic current equilibrium are necessarily part of this

GENE (p) [GENE is a nonlinear gyrokinetic code to investigate plasma turbulence]

ESEL (p) [Turbulence and profile evolution at the outboard midplane in the SOL using a fluid (ESEL) and gyrofluid (GESEL) approach]

TYR (p) [Drift Alfven plasma fluid turbulence and transport in flux-tube geometry.]

2007 - 2013 e-infrastructure

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